ABDOMINAL INJURY

*Incidence :-

- Spleen is the most common organ to be injured in blunt trauma, liver is the 2nd common one (spleen & liver account for 75% of all abdominal injuries).
- other organs as kidneys, stomach, bowel, ...etc may injured & may cause shock. adult 18-40 yr RTA ♂

*Aeitiology :-

- Trauma ŵ may be
  - closed (blunt)
    - Direct :- fall, RTA.
    - indirect :- fracture rib.
    - spontaneous :- pathologic organ
  - open :- gunshot, stab, iatrogenic.
- (blunt means peritoneum not opened unlike penetrating)

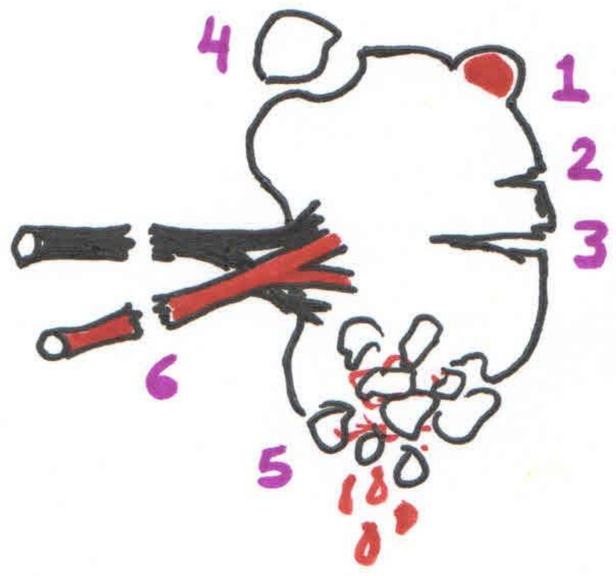
closed = blunt
open = penertra

NB :- delayed rupture spleen may occure in 5% of cases (days – weeks) after subcapsular hematoma, or blood clot or greater omentum seals tear then removed

types trauma ① (blunt) → perit. not involved / not sharp / no communic ē atmosph.
② (penert) → pent. involved / sharp object / communicate ē perit
③- pressure trauma → runover, falldown

* Pathology :-

- types of rupture of spleen & liver as follow :-
  1. subcapsular hematoma.
  2. superficial tear (s).
  3. deep tear (s).
  4. avulsion of a pole.
  5. complete depulping.
  6. vascular pedicle injury.



***NB :-** in kidney :-
- ① Bruising & ecchymosis (commonest)
- ② subcapsular
- ③ cortical tear
- ④ Medullary tear
- ⑤ corticomedullary
- ⑥ avulsion
- ⑦ avulsion of whole kidney.

VISIT…



imp. notes on type of injury :-

① Penetrating injury :- (stap, gunshot, ... etc)

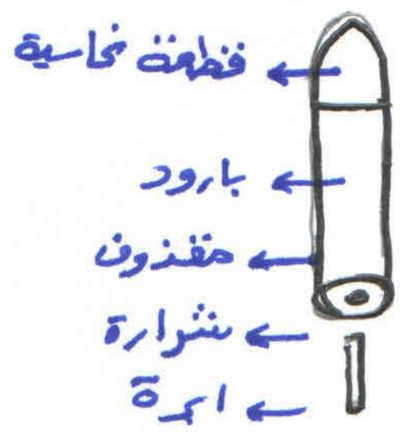
- Peritoneum involved, sharp object, direct communication with atmosphere.
- Gunshot more dangerous than stab wound due to ① velocity ② burning.

★ Stap wound :- ① cutting.
② splitting.
③ injury only in it's tract (tissue around tract healthy)

- organs involved in stap wound know by :
  ① site of stap.
  ② depth (difficult to know).
  ③ direction (angle)



★ Gunshot :- characterised by :-
① penetrating.
② burning.
③ reflection (bullet hit the bone & reflect causing ✱ & damage 2ry)
④ injury to structures around the tract "shot way injury"



- organ involved can't be known in gunshot

② blunt trauma :- (RTA commonest)

- Peritoneum not involved, not sharp, no atmosph. comm.
- liver & spleen mostly involved,
- Diaphragm most commonly involved by compression injury
- pancreas most common involved by crushing injury (bet 2 rough organs as liver & spleen "semifixed")

③ Pressure trauma :- (falldown, runover) :-

- falldown may → hip dislocation, compression vertebra ✱
- falldown may injury spleen (short vessels), splenic vessels cut or liver (hepatic vein cut)

MANAGEMENT :- (should be very fast esp. shocked pt)

• **History :-** H/O trauma (site, size, speed) + abdominal Pain ± shock, PMH PSH

• **Examination :-** - bruises, Stab, ... etc vital signs.

- s/s of shock (hypothermia, hypotension, ↑ HR, ↑ RR..)

• Cullen's sign :. in 20% of pt ē splenic trauma (bluish discoloration around umbilicus)

• Kehr's sign :. pain referred to Lt shoulder from irritated diaphragm especially with trendelenberg's position (↑ ē inspiration)

- Tenderness & guarding ± rebound tenderness.

- pale, thirsty, anoxious (fear of death) sweating

• Grey Turner & Cullen sign : in pancreatic injury

(NB:. if pt comatosed not tenderness)

• **investigations :.**

- CBC [Hg (base line), WBC, HCT, plt] bd gp, cross match

NB Hg not changed in first hours after trauma may take 24 hrs.

- U/S abdomen (best one)., X-ray
- CT scan ~~in special situation~~ (gives site of bleeding, grades of trauma)
- MRI in special situations
- Laparoscopy, ~~X-ray~~, DPL (diagnostic peritoneal lavage) angiography.

(US used to check bd in Rt hypochondrial, Lt hypochondrial, pericardium & pelvis).

- if pt hemodynamically stable send to spiral CT if unstable laparotomy.

• **DPL "Diagnostic peritoneal lavage" :-**

- inserting intraperitoneal catheter just below umbilivous under LA & inf using 500 cc saline inside perit. cavity if stained bd or Pink → intraperit. bleeding.

• **Plain X-ray :-** see ※ ribs, bullets, ...etc.



- if Splenic Hge ← Displaced stomach bubble to Rt
  - splenic flexure inferiorly
  - Lt copula diaph. superiorly
  - obliterated Psoas shadow.

* Treatment :-

1. Call for help.
2. Resuscitation :- ABC
   - Airway must be patent.
   - Breathing (check RR).
   - Circulation (check pulse) → 2 large canula I.V fluid
3. Diagnosis of trauma :- if stab wound is knife should be removed but if gun of sea (fishing) don't remove.
4. definitive treatment → surgery laparotomy. (don't loose time)

NB :- if stap wound ē traversed peritoneum → decision is quick laparotomy.

- if gun shot ē traversed peritoneum → decision is immediate laparotomy.

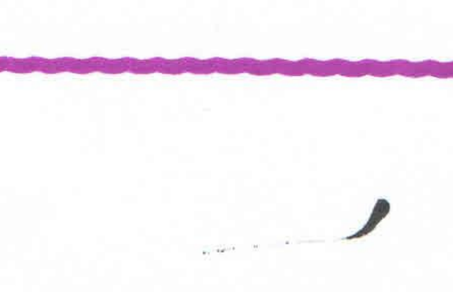
- treatment is laparotomy (done always under GA) upper midline incision always.

- Stomach → simple repair stitching
- small bowel → simple stitiching or resection + anastmosis
- large bowel (colon) → decompression colostomy (Hartman's procedure)

- spleen → tear : stitching (spleenorhaphy)

major injury & vascular inj → spleenectomy

Splenic mesh wrap :- placing injured spleen in mesh as tamponade.



- splenic preservation :- needed especially in children as it plays imp. rule in immunity against pneumococci
- Pneumovax (pneumococcal antitoxin) should be given after spleenectomy up to 18 yr to avoid the OPSI (Over-whelming Post-Spleenectomy Infection).

- Liver trauma :-

  - Small tear :- - stitching (absorbable sutures).
    - Diathermy (ball diathermy).
    - Argon laser.
    - application of chemicals . surgicell.
  - large laceration :- partial hepatectomy
    - Packing if large (no total hepatectomy).
      ↳ using abdominal towels.

(in resuscitation prepare at least 10 units bd, FFP to avoid irreversible coagulopathies due to lack of fibrinogen & clotting factors)

- Pringle's maneuver :. clamping at foramen of Winslow to stop bleeding to stitch.

- Pancrease trauma :-

  - if duct injury in tail → distal pancreatectomy.
  - if injury at head → Whipple's operation.

(mostly panc. injury related to ductal injury.

* Complications of Liver trauma :-

1- intrahepatic hematoma, Liver abscess.
2- Bile collection & biliary fistula.
3- hepatic artery aneurysm.
4- arterio-venous fistula.
5- arterio-biliary fistula.
6- Liver failure, death.

Mortality rate ⇝ 15-20%
⇝ 70% if three organ injured.

* Other classification of trauma :-

- CT injury Grading scale of spleen & liver :-

- Grade I :- laceration (s) < 1 cm deep.
  - subcapsular hematoma < 1cm diameter.
- Grade II :- laceration (s) 1-3 cm deep.
  - subcapsular or central hematoma 1-3 cm.
- Grade III :- laceration (s) 3-10 cm deep.
  - subcapsular or central hematoma 3-10 cm.
- Grade IV :- laceration (s) > 10 cm deep.
  - subcapsular or central hematoma > 10 cm.
- Grade V :- tissue maceration or devascularization.

- Staging of renal trauma :.

- Stage I :- contusion/hematuria.
  - II :- laceration < 1cm without urinary extravasation.
  - III :- " > 1cm " " " .
  - IV :- urinary extravasation.
  - V :- Shattered kidney or avulsion of pedicle.

NB:- Staging does not necessarily correlate well with clinical status

imp. notes on anatomy :-

- Retroperitoneal organs :- kidneys, ureter, bladder, pancrease, ascending & descending colon, rectum, vena cava (IVC), uterus, duodenum (except the 1st ~~part~~ inch is completely covered)

> NB :- Rectum upper ~~part~~ third covered anteriorly.
> middle third covered anterior & laterally
> lower third not covered

- Supra colic compartment:-
  involve stomach, liver, pancrease, spleen, duodenum
- Infra colic compartment:-
  involve small bowel [supra & infra colic separated by trans. colon]

- Factors ẅ affect movement of fluid inside abdomen
  1- gravity.
  2- normal compartment (intraperitoneal, retroper., supracolic...etc)
  3- abnormal compartment (as adhesions, inflammations...)
  4- diaphragmatic movement.
  5- peristalstic movement